The Torehine Beds of Coromandel Peninsula

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Abstract.

Microfaunal evidence indicates that the Torehine Beds of Coromandel Peninsula are Waitakian-Duntroonian in age. This determination assists in limiting the age of the First Period Volcanics of the area.

INTRODUCTION.

Because of the economic importance of its goldfields, Coromandel Peninsula was the subject of many geological reports in the period 1870-1910. The scattered outcrops of Tertiary sediments in the northern portion of the peninsula were first examined in detail by McKay (1886), and his report formed the basis of later accounts given by Park (1897) and McKay (1897). Fraser and Adams (1907) gave a detailed description of the beds, grouping them as the Torehine Series which, on the basis of earlier accounts by Park (1897) and MacLaren (1900), they regarded as Lower Eocene in age. Since the publication of Fraser and Adams' account the Torehine Beds have received no attention in geological literature.

One of the present authors visited several of the outcrops in 1946 in the company of Dr. B. H. Mason and it was then thought worthwhile to examine the beds in the light of the modern standard Tertiary subdivision. A further visit was made by the writers in 1951 and the opportunity was taken to collect systematically from the several beds. It is apparent from the accounts given by previous workers that the beds were formerly far better exposed than they are today and, in common with most of the later authors, the writers can add little to McKay's original (1886) description.

In the course of the present survey the following localities were visited:—

(a) Torehina (= Torehine of earlier writers) 1 mile north of Amodeo Bay.

(b) Cutting on main road 300 yards south of Tawhetarangi Creek, Amodeo Bay.

(c) Valley of Umangawha Stream, $1\frac{3}{4}$ miles east of Torehina (= "west branch of the Umangawha River" of McKay, 1886, and "Branch Creek" of Fraser and Adams, 1907).

(d) Coast $1\frac{1}{4}$ miles east of Cape Colville.

In addition, samples for microfaunal study were collected from a cutting on the main road 1 mile east of Torehina.

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STRATIGRAPHY.

The basal beds are "coal measures" which are best exposed in a cutting on the main road 300 yards south of Tawhetarangi Creek. Here the succession in descending sequence is as follows:—

(6) Dark sulphurous mudstone (at least 10 feet thick).

(5) Coarse sandstone with impure coaly bands (5 feet).

(4) Light-coloured sandy shales with plant remains (5 feet).

(3) Greywacke conglomerate (5 feet).

(2) Light-coloured shales similar to (4).

(1) Pre-Tertiary basement (Manaia Hill Series).

At this locality the beds are intersected by an andesite dyke and also by a minor fault.

The most nearly complete section of the beds is that exposed at Torehina. The succession, as given by Fraser and Adams (1907, p. 55), is:—

Coralline limestone with foraminifera (top).

Calcareous sandstone.

Marly sandstone.

Sandy shales with carbonaceous material.

Conglomerates.

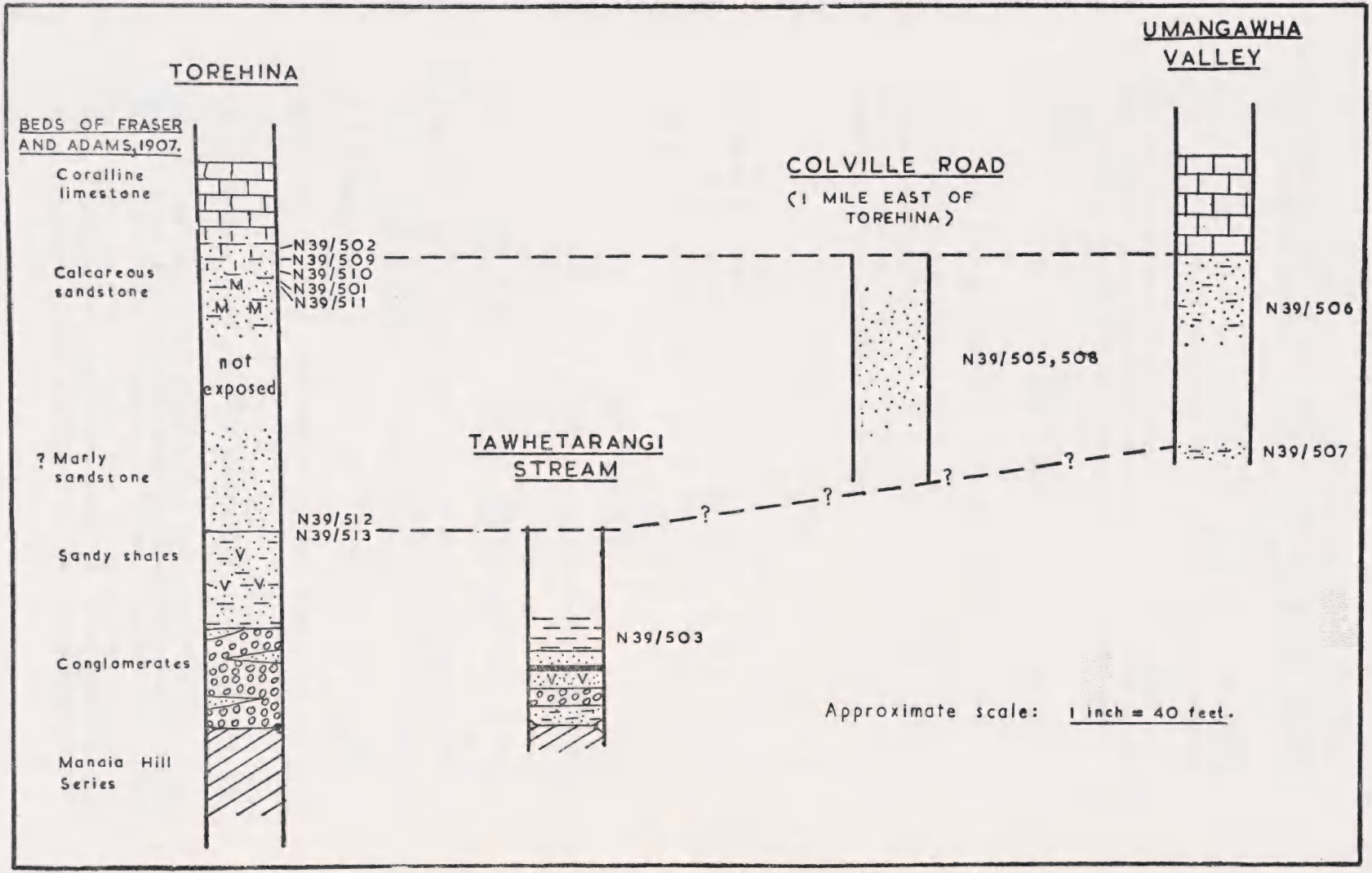
(Readers are referred to Fraser and Adams, *loc. cit.*, for a more detailed account of the succession.)

The conglomerates are intraformational and consist mainly of fragments of the sandy shales, although greywacke pebbles are more abundant towards the upper limit. They rest unconformably on the upturned beds of the Manaia Hill Series (Fig. 1), and together with the sandy shales are equivalent to the beds exposed south of Tawhetarangi Creek. The marly sandstone is now poorly exposed, being represented only by weathered outcrops at the back of Torehina Beach. The next point north of Torehina consists of a glauconitic shelly limestone ("coralline limestone") which grades downwards into a fossiliferous calcareous sandstone.

At Torehina the main road to Colville turns inland and climbs over the divide into the valley of Umangawha Stream. Towards the summit of the road a blue-grey medium sandstone which is probably equivalent to the fossiliferous calcareous sandstone at Torehina is exposed in the road cuttings.

The section in the valley of Umangawha Stream is obscure, but both the limestone and the calcareous sandstone can be recognised. Some distance below these is a dark, carbonaceous mudstone which possibly represents the basal beds of the coastal section.

The outcrop near Cape Colville is restricted to a cliff face approximately 50 yards in width. Fraser and Adams (1907, p. 58) give the following succession:—



Text—fig. 1. Stratigraphic columns of outcrops of Torehine Beds.

Sandstones and mudstones (top).

Shelly conglomerate (2 feet to 3 feet), marly sandstone (10 feet), shelly conglomerate (1 foot).

Marly sandstone (15 feet to 20 feet).

Shelly conglomerate (20 feet), (highly fossiliferous).

The authors were unable to distinguish all the beds mentioned by Fraser and Adams and it appears that the vigorous wave erosion at this locality has greatly altered the exposure during the last 40 years. There was no trace of the basal "highly fossiliferous" conglomerate and the two samples collected for microfaunal study proved barren. The beds are lithologically dissimilar to those at Torehina.

AGE AND CORRELATION.

Both in 1946 and 1951 samples were collected for foraminiferal study. The stratigraphic positions of the samples collected are shown in Text—fig. 1, and the writers are indebted to the late Dr. H. J. Finlay and Mr. N. de B. Hornibrook, of the New Zealand Geological Survey, for the following age determinations:—

Locality.	Sheet Sample No.	Grid Reference.	Age.
Torehina	N39/f501	946834	Waitakian-Duntroonian
"	N39/f502	"	No fauna
"	N39/f509	"	? Duntroonian
"	N39/f510	"	Waitakian-Duntroonian
"	N39/f511	"	" "
"	N39/f512	946833	" "
"	N39/f513	"	" "
Tawhetarangi Creek	N39/f503	943823	No fauna
Colville Road	N39/f505	964832	Waitakian-Duntroonian
" "	N39/f508	"	No fauna
Umangawha Valley	N39/f506	976830	Duntroonian
" "	N39/f507	976829	? Duntroonian

Thus the foraminiferal faunas indicate a Waitakian-Duntroonian age for the Torehine Beds at and near Torehina. The lithologically distinct beds at Cape Colville could well be of different age.

The Torehine Beds may be correlated with the younger members of the Whangarei Group of North Auckland. Marshall (1916, pp. 89 and 93) remarked on the lithological resemblance between the Whangarei Limestone and the crystalline limestone of the Torehine Beds.

MINERALOGICAL ASPECTS OF THE TOREHINE BEDS.

A qualitative check was made on the non-opaque, heavy mineral content of sandstone samples from localities (a), (c), and (d) above. In all samples the heavy mineral suites were limited in their content, the few species present being the more stable ones that are typical of the greywacke undermass. These are apatite, brown biotite, garnet, titanite, green tourmaline and zircon. One grain of common augite was located,

but a source for this may be found in tuffaceous facies of the greywacke. The general absence of ortho- and clino-pyroxene confirms the position of the Torehine Beds as antedating the main effusion of andesite.

Following a discussion of the evidence available, Fraser and Adams (1907, p. 89) assign a pre-Jurassic age to the diorite that intrudes the Moehau Series (pre-Jurassic) on the west flank of Moehau Range. The lack of hornblende in the Torehine sediments suggests that this diorite was not exposed to erosion in Waitakian-Duntroonian times but was still contained by the pre-Tertiary country rock. This view is strengthened by the fact that diorite pebbles are absent from the basal conglomerate.

DISCUSSION.

In Coromandel Subdivision, the First Period Volcanics rest unconformably on the Torehine Beds, which are now known to be of Landon age and are, in turn, covered unconformably by volcanic rocks of the Second Period. Plant microfossils from Second Period rocks of Great Barrier Island indicate an Upper Taranakian or Lower Wanganuian age (Couper, 1953). The First Period Volcanics, therefore, are either Pareoran or Southlandian.

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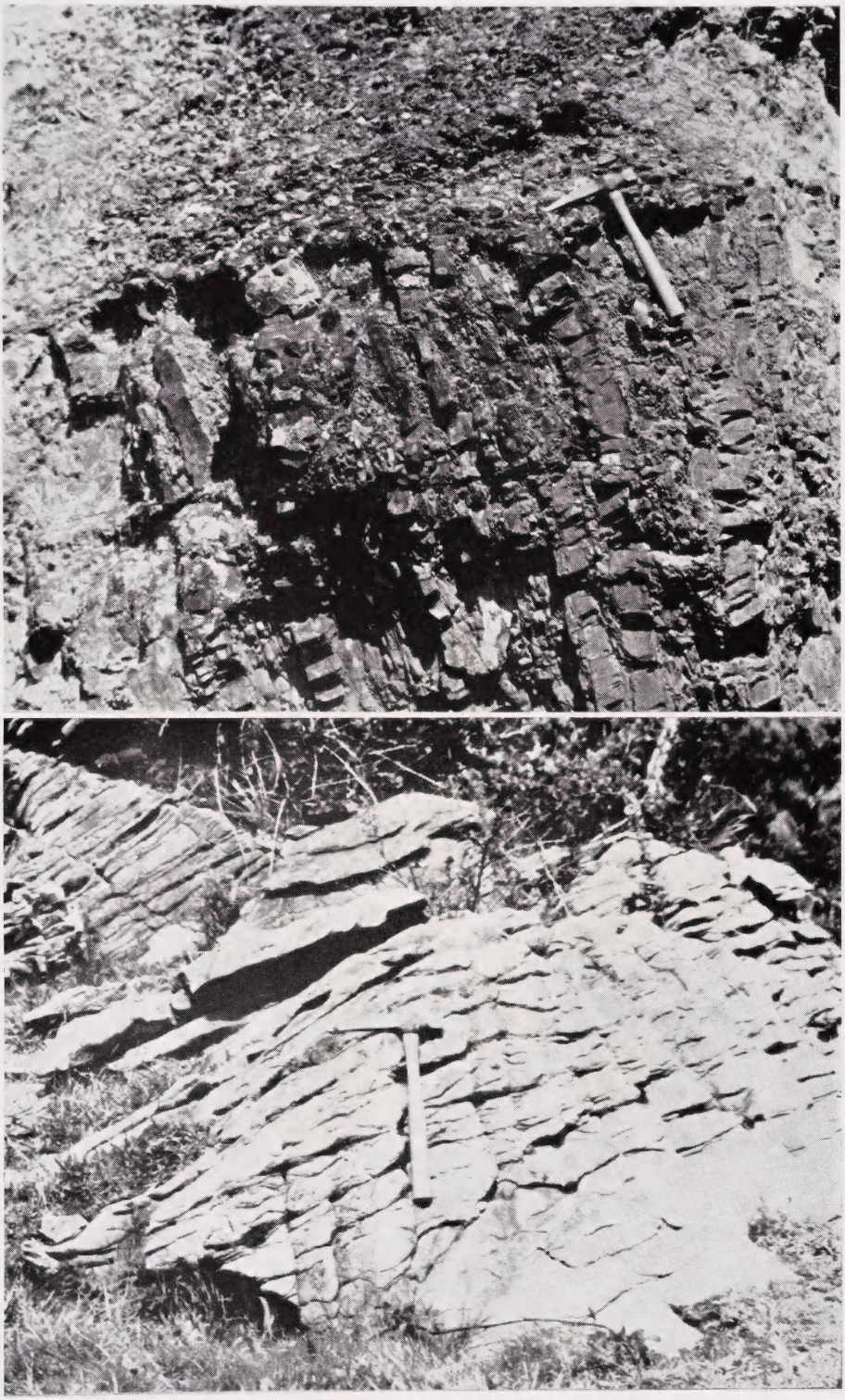

Fig. 1. Angular unconformity between Manaia Hill Series (Jurassic) and Torehine Beds (mid-Tertiary); coast at Torehina.

Fig. 2. Crystalline limestone; valley of Umangawha Stream.